



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street
San Francisco, CA 94105-3901

OCT 11 1994

Cay Goude
Ecological Services
U.S. Fish and Wildlife Service
2800 Cottage Way
Sacramento, California 95825

Re: Section 7 Consultations on EPA Water Quality Standards -
Updated Species List

Dear Ms. Goude:

In our continuing Section 7 consultations, we have been discussing with your staff the revised list of species that may occur in the area covered by the EPA water quality standards or that may be affected by those standards. This letter summarizes our discussions.

1. Candidate Species

The majority of the species identified in your species list dated September 16, 1994, are "candidate" species under the Endangered Species Act (ESA). Although Section 7 does not impose any consultation or conferencing obligations on Federal agencies for candidate species, EPA would like to assure that the water quality standards it promulgates are consistent with the protection of these candidates. We are most concerned about those species that may be directly dependent on the aquatic ecosystem in the Bay/Delta. These include especially the longfin smelt (*Spirinchus thaleichthys*) and the candidate plant species dependent upon the brackish marshes in the Suisun Bay (such as the Suisun aster (*Aster chilensis* var. *lentus*), delta tule pea (*Lathyrus jepsonii*), and Mason's Lilaopsis (*lilaopsis masonii*)). EPA would appreciate any technical advice you can provide as to any possible adverse effects of EPA's water quality standards on these candidate species.

2. Proposed Species

One of the proposed species, the Sacramento splittail (*Pogonichthys macrolepidotus*), would clearly be affected by implementation of EPA's water quality standards. Although EPA does not believe that its standards will jeopardize the splittail (the applicable standard for conferences under 50 CFR § 402.10), we have

agreed that the Service will include a conference opinion on the splittail in its larger opinion on the water quality standards.

Two other proposed species, the California red-legged frog (*Rana aurora draytonii*) and the California sea blite (*Sueada californica*) occur in the Bay/Delta area. Our discussions with your office indicate that neither species is likely to be adversely affected by implementation of the standards, primarily due to the particular habitat occupied by each proposed species. Accordingly, pursuant to 50 CFR § 402.13(a), EPA is requesting your written concurrence with this finding of no adverse impact.

3. Listed Species

In addition to the delta smelt (*Hypomesus transpacificus*) and the winter-run chinook salmon (*Oncorhynchus tshawytscha*) (under the jurisdiction of National Marine Fisheries Service), we have determined that a number of additional listed endangered or threatened species may be affected by the implementation of the EPA water quality standards.

Two species, the giant garter snake (*Thamnophis gigas*) and the Aleutian Canada goose (*Branta canadensis leucopareia*), are especially dependent upon the flooded rice fields and Bay/Delta island wetlands for habitat for all or a part of their life cycle. If the State Board implements the EPA water quality standards (or equivalent state standards) in such a way as to reduce that habitat, adverse affects may occur. We have agreed that this is an issue that should be revisited in reinitiated consultations when the State Board adopts an implementation plan for Bay/Delta standards.

The bald eagle (*Haliaeetus leucocephalus*) relies on habitat immediately adjacent to many of the reservoirs upstream of the Bay/Delta for a large portion of its life cycle. If the State Board implements these or similar water quality standards in a way that causes the water levels in these reservoirs to drop drastically, the bald eagle may be adversely affected. Again, this is an issue that should be revisited during reinitiated consultations when the State Board adopts an implementation plan for Bay/Delta standards.

Two additional species, the California clapper rail (*Rallus longirostris obsoletus*) and the salt marsh harvest mouse reside in the marshes of the Bay/Delta, including in Suisun Marsh. Both are more characteristic of salt marshes rather than brackish marshes. The narrative Suisun Marsh criteria in EPA's water quality standards calls for maintenance of salinity gradients in the Marsh adequate to provide the entire range of marsh habitat. EPA anticipates that the higher elevations within the Suisun Marsh, which are characterized by higher salinities, will provide ample habitat for these two species.

Finally, our discussions with your office suggest that the

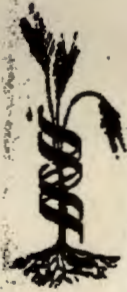
listed valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and the American peregrine falcon (*Falco peregrinus anatum*) are not likely to be adversely affected by implementation of the EPA water quality standards. Again, this is due to the peculiar habitat needs of each species, which are not dependent in any meaningful way of the aquatic ecosystem in the Bay/Delta. Accordingly, and again pursuant to 50 CFR § 402.13(a), EPA is requesting your written concurrence with this finding of no adverse impact on these two species.

If you have any questions about this summary or about any of our findings, please call me as soon as possible at (415) 744-1993.

Sincerely,


Patrick Wright
Chief, Bay/Delta Section
Water Management Division

cc: Gary Stern, NMFS



Gregory A. Thomas
President

Natural Heritage Institute

114 SANDSOME STREET, SUITE 1200
SAN FRANCISCO, CA 94104
(415) 288-0130
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Non-Profit Law and Consulting in Conservation of Natural Resources and the Global Environment

October 13, 1994

TO: Betsy Rieke
FR: David Fullerton
RE: Reaction to New Urban/Ag Bay-Delta Standards Proposals

I heard that you will be meeting with urban and agricultural representatives on Friday to discuss their latest proposal for Bay-Delta Standards and thought that it might be helpful for you to understand the concerns we have with that proposal.

The urban/ag proposal represents a detailed set of flow, salinity, and operations (gate closures, pumping restrictions, etc.) standards. The purpose of the proposal is to provide enough environmental protection to get the federal government out of California water management, while minimizing the impacts on water supplies.

I am struck by the degree to which the urban community (and increasingly the agricultural community) now accepts that environmental improvement in the Estuary is inevitable and am impressed by their efforts to develop a workable accommodation. There are many elements of their plan which are non-controversial. For example, the urban/agricultural proposal for dealing with X2 is close enough to the EPA and environmental views that I am not very concerned about the differences.

There are other areas, however, in which the urban/ag proposal appears (to the environmental community) to be deficient. The urban/ag group is aware of our concerns, but has yet to enter into a dialogue with us on how these concerns might be addressed.

Specific concerns identified by the environmental community with the urban/ag proposal are as follows:

1. It ignores EPA's San Joaquin Warm Water Habitat standard (formerly the striped bass standard).

This standard was designed by EPA to assure that salinities in the lower San Joaquin River would be low enough for spawning by striped bass (and possibly other species).

The City of San Francisco has opposed the standard because it believes that the standards might be met through dilution flows from Hetch Hetchy and elsewhere. However, the EPA has affirmed that the standard could be written so that compliance with this standard is solely through control of saline discharges upstream. Therefore San Francisco's concern over water losses is unfounded and is standing in the way of an adequate standard.

2. San Joaquin River salmon protection -- April to May -- is inadequate.

The EPA standards require the protection of the salmon smolt downmigration in April and May. The idea is to provide the smolts with safe passage past the state and federal export pumps. This can be done by a combination of high flows in the river, barriers to keep fish away from the pumps, and reductions in export pumping. We feel that the urban/ag proposal is totally inadequate in this area. The proposal not only provides for flows down the San Joaquin which are much lower than USFWS recommendations, it would allow pumping by the export pumps of 100% of the San Joaquin River flows during this period (much higher than USFWS recommendations). At these export levels, export pumps are likely not only to take a lot of salmon smolt, but to take Delta smelt and other species.

3. The limits on Delta exports need a great deal of work

The urban/ag proposal addresses the need to control the amount of environmental damage caused by the export pumps by limiting Delta exports to a fixed fraction of Delta inflow each month. Thus, as Delta inflow increases, allowable exports increase by a fraction of the inflow. In addition, when fish losses at the export pumps are below some trigger level, they propose to increase the level of allowable exports.

Linking allowable pumping to Delta conditions (flow and population distribution) is an attractive approach because it allows for (1) reduced pumping when pumping is dangerous to the environment and (2) increased pumping when the Delta is not at risk. Thus, the water reallocations needed for adequate environmental protection can be minimized.

Unfortunately, the current proposal will not work as billed. A simple ratio between Delta inflow and Delta exports is too simple. Moreover, we are not yet at the point where we can reliably use monitoring data to show whether or not it is safe to increase export levels. What we need is a more sophisticated standard which more accurately reflects the harm (or lack of harm) caused by pumping under different physical conditions (e.g., high flow versus low flow conditions, the distribution of inflow between the Sacramento and San Joaquin Rivers, etc.). I hope that the urban/ag group will work with us on this concept. It is certainly to their advantage to set pumping limits in such a way that ESA take limits do not need to be invoked on an unpredictable basis.

DCT-13-1994 16:55 FROM NATURAL HERITAGE INST.

TO

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4. Protection of Sacramento spring run salmon is inadequate.

Spring run salmon need the same protections now afforded to winter run salmon if we are to avoid another ESA listing. That means that the Delta Cross Channel should be closed and strong Sacramento flows provided from November through the spring (so that the salmon smolts can move through the Delta quickly without getting swept into the central Delta).

The urban/ag proposal would not close the Delta Cross Channel until January, and would not provide adequate Sacramento flows until February. The urban/ag block has justified the failure to close the gates during November and December on the idea that upmigrating salmon in the Central Delta might be blocked from moving upstream. However, the biologists we have talked to and USFWS are skeptical that this blockage is a major problem since Georgiana Slough would still be open.

We are now developing a set of standards which would fix the problems we have identified with the urban/ag proposal. Our draft should be ready next week. We will send it to you as soon as it is available.

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

of pages > 1

To	Mary Ellen Levine	From	Nagler
Dept./Agency	OCC-Water	Phone #	(415) 744-138
Fax #	202-260-7702	Fax #	

NSN 7540-01-317-7368

5099-101

GENERAL SERVICES ADMINISTRATION

RULE 1.MEM

on G:DELTA

MEMORANDUM

DATE: October 17, 1994
TO: Tom Hagler
FROM: Bruce Herbold
RE: DC comments on rule

Recently you requested clarification on three aspects of the development of the estuarine habitat protection measure.

1. In the final rule we are using a model developed by Contra Costa Water District instead of the model developed by Kimmerer and Monismith for the SFEP that was used in the proposed rule. These model have two differences.

The CCWD model models salinity at a particular location whereas K-M models the location of a particular salinity. Thus, K-M can predict whether X2 is upstream or downstream of a given location whereas the CCWD model can predict if the salinity at the same point is greater or lesser than 2 ppt. Because we are using fixed control points either model can be used.

The CCWD model is more accurate because it predicts salinity based not only on flow (as in the K-M model) but also the characteristics of the location being modeled. Thus, the relationship between flow and salinity is slightly different at Roe Island than at the Confluence and only the CCWD model reflects that change in relationship.

I have included in the administrative record a memo reflecting my conversations with both Drs. Kimmerer and Monismith who conclude that the CCWD model is a better model.

2. Use of the "8-River Index" in the final rule rather than the Sacramento River Index in the proposal is largely a reflection that no meaningful standards have been promulgated before now that relate to total delta outflow. Most standards and proposed standards have identified flows along one river or another so that the SRI or, in some recent cases, a San Joaquin River Index so that one scale or another is appropriate to scale standards against.

The X2 standard responds to net delta outflow and, therefore a measure of the net unimpaired flow is the appropriate measure against which to scale this standard. Sacramento accounts for usually about 80% of net delta outflow and the San Joaquin River accounts for most of the remaining 20 %. Thus, the 8-River Index provides a measure of the total Central Valley precipitation in each month.

3. In attempting to model the number of days in a month that

occur in relation to an independent variable like unimpaired flow the logistic model has a clear advantage. Linear models fail to account for the fact that no more than 30 and no less than 0 days can occur in most months, logistic models incorporate these parameters. Inspection of the historical data also reveal a sharp change in the relationship between unimpaired flow and X2 days which is much more effectively modeled by the S shaped nature of the logistic model than a a linear or quadratic model. Finally, the logistic model is used for many cases where the data are assumed to be binomial, i.e. where the data are either "in" or "out" as in alive/dead or as in X2 upstream/X2 downstream.

I hope this is adequate to explain the differences in approach used in the draft and final rules.

STATE WATER RESOURCES CONTROL BOARD

THE PAUL R. BONDERSOON BUILDING
901 P STREET
SACRAMENTO, CALIFORNIA 95812-0100

Mailing Address:

DIVISION OF WATER RIGHTS

P.O. BOX 2000, Sacramento, CA 95812-2000

**OCTOBER 18 1994**

Mr. Patrick Wright
Bay/Delta Program Manager
W-3, Water Management Division
Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Dear Mr. Wright:

NARRATIVE STANDARD FOR PROTECTION OF TIDAL MARSHES OF SUISUN BAY

After reviewing the proposed narrative standard, I recommend that you delete it. If you do not delete it, you should at least revise it. A possible revision would be as follows:

Water quality conditions sufficient to support the existing diversity of plant species composition and wildlife habitat throughout all elevations of the tidal marshes bordering Suisun Bay shall be maintained. Permanent conversion of brackish marsh to salt marsh from increased soil or water salinity shall not be permitted.

With respect to your version, "diversity" should be changed to "species composition". I don't believe you mean to have a gradient from more species to fewer species. Rather, you mean to have a gradient from freshwater species to salt-tolerant species, retaining a mix of different species within any one area.

The standard should specify that it is meant to prevent permanent conversion to salt marsh. Seasonally or during a long drought the tidal marshes may become salty enough to be considered saltwater marshes, but would be brackish at other times. Temporary changes like these should not be considered a violation of the standard.

I am not sure what your version of the draft standard means by "permanent reduction in plant stature and percent cover from increased water or soil salinity or other water quality problems shall be maintained." This language does not seem to make sense with the rest of the sentence. It appears to run on, and it is not clear which earlier phrase or phrases are being modified. Therefore, I am at a loss to suggest a better wording.

The purpose of the second sentence in the above version is to take into account the natural variations that occur in the tidal marshes as a result of radically varying hydrological cycles. Almost all of the precipitation occurs during the winters, and summers are dry in the watershed of the Bay-Delta. Further, annual precipitation amounts and patterns vary widely. In one year, the precipitation may be 40% of average, while in another year it may be 200% of average. Some wet years have predominantly dry winters with short, intense storms. With this variation, plants communities in particular can be expected to vary. In some years seeds of a species may stay dormant in the soil, waiting for the right conditions to germinate. The criterion should not be violated merely because a few salt marsh plants grow under changing conditions, where fresher water will be available during other time periods or water years. Likewise, the presence of animals that also inhabit salt marshes should not indicate a violation.

The list of species should be deleted. It does not add anything except confusion. Are other species to be ignored? What if some of these species are absent from a given site? The list will become outdated as species are added or deleted from the endangered and threatened species lists or candidate lists. If some of these species are not present all the time in every marsh, their absence should not be construed as a violation of the criterion. Further, the list reduces the flexibility of the criterion at a time when it is not clear exactly what the criterion should look like in the future. The SWRCB may be willing to adopt a similar objective, but upon further review could have technical problems with including certain species. For example, some of the species are common, and not endangered or threatened at all. While their habitat should be protected, these species do not require extraordinary protection.

Even if EPA adopts my revised version, which I believe is more measurable, it never would be clear whether or not the criterion was being met. I recognize that you are proposing an unmeasurable narrative criterion as a place holder because you do not have enough information to establish a specific criterion, but it would be better not to establish a further criterion. A narrative criterion is not needed. The purpose of the proposed narrative criterion is to protect estuarine habitat, but this is also the purpose of the numerical salinity criteria proposed for Suisun Bay, which should adequately provide that protection.

Further, a narrative criterion that cannot be quantified objectively will be difficult or impossible for the SWRCB to implement. Since it is not specific, the SWRCB could be accused either of failing to enforce the standard or of requiring more than the standard requires. Either way, it could generate litigation.

Mr. Patrick Wright

-3-

EPA's proposed narrative criterion does not meet EPA's guidance as described in Question 8 which accompanied the January 6, 1994 version of the proposed rulemaking. According to Question 8, "such narrative criteria should include specific language about conditions that must exist to protect a designated use, and must be quantifiable so that numeric standards can be developed" EPA's proposed criterion is especially vague and general, and is not quantifiable.

Since EPA apparently is saying that the proposed narrative criterion can be adopted, could you please provide further explanation as to the level of specificity that the SWRCB's objectives must reach before EPA will approve them. I have had the belief that EPA would not approve the SWRCB's objectives if, for example, the estuarine habitat objectives were not quantified, and simply provided: "Water quality conditions sufficient to support existing estuarine habitat shall be maintained."

Sincerely,

A handwritten signature in dark ink, appearing to read "Edward C. Anton", written in a cursive style.

Edward C. Anton
Chief, Division of Water Rights

Admin Recd

STATE WATER RESOURCES CONTROL BOARD

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Mr. Patrick Wright

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Sincerely,

/s/

Edward C. Anton
Chief, Division of Water Rights

Mr. Patrick Wright

-4-

bcc: Walt Pettit, EXEC
Bill Attwater, OCC
Andy Sawyer, OCC
Barbara Leidigh, OCC
Jerry Johns, DWR
Tom Howard, DWR
Margie Gliatto, OCC

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d:leidigh\wright.ltr

10/20/94

USFWS Methodology for Estimating the Delta Smolt Survival Index

Fish for release are tagged at the hatchery with coded-wire tags, and fin clipped. With one exception, all USFWS releases for estimating Delta survival indices have been fish from the Feather River hatchery. Fish are trucked from the hatchery to the release site, and immediately released into the river.

Approximately 50,000 to 100,000 fish of smolt size (size greater than 75 mm) are released for each survival index estimate, depending on expected mortality. Sacramento on the Sacramento River and Mossdale on the San Joaquin River are the USFWS release sites most representative of Delta survival for these two river systems. As a control for the ocean recovery survival index, one or two groups per season are released at Benecia or Pt. Chicago.

From one upstream release of tagged fish, fish are usually caught over a period of one to two weeks at Chipps Island. Daylight sampling at Chipps Island with a 9.1 by 7.9 m, 3.2 mm cod end, midwater trawl is begun 2 to 3 days after release. The trawl fishes approximately the upper one-half of the water column where over 90% of the smolts are found during daylight (Wickwire and Stevens, 1970 as cited in USFWS, 1987). When the first fish is caught, full-time trawling 7 days a week begins. Each day's trawling consists of ten 20 minute tows generally made against the current, and distributed equally across the channel. If at all possible, full-time sampling continues until the last tagged fish is caught.

The Chipps Island smolt survival index is calculated as:

$$SSI = R \div MT(.007692)$$

where R = number of recaptures of tagged fish

M = number of marked (tagged) fish released

T = proportion of time sampled vs total time tagged fish were passing the site (i.e. time between first and last tagged fish recovery)

The value .007692 is the proportion of the channel width fished by the trawl, and is calculated as trawl width/channel width.

Recoveries of tagged fish from the ocean salmon fishery two to four years after release are also used to calculate a survival index for each release. Smolt survival indices from ocean recoveries are calculated as:

$$OSI = R_1/M_1 \div R_2/M_2$$

where R₁ = number of tagged adults recovered from the upstream release

M₁ = number released upstream

R₂ = number of tagged adults recovered from the Port Chicago release

M₂ = number released at Port Chicago

The number of tagged adults recovered from the ocean fishery is provided by the Pacific States Marine Fisheries Commission, which maintains a port sampling program.

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Exhibit 31, entered by the U.S. Fish and Wildlife Service for the
State Water Resources Control Board 1987 Water Quality/Water
Rights Proceeding on the San Francisco Bay/Sacramento-San Joaquin
Delta.

The Needs of Chinook Salmon: Oncorhynchus tshawytscha..
in the Sacramento-San Joaquin Estuary

Section 4

SMOLT SURVIVAL

We compared smolt survival under varied conditions in an attempt to identify the factors operating in the Estuary that influence the number of smolts entering the ocean. Survival experienced by smolts in the Estuary will have a direct affect on the number of adult salmon that are produced.

Smolt survival in the Estuary was estimated by using two separate approaches using the recovery of marked hatchery smolts.

The first approach was based on recoveries of marked adult chinook from the ocean fishery two to four years after they were released as marked smolts. They were used to estimate survival through the Delta between the town of Sacramento (at the northern edge of the Delta) and Suisun Bay (Figure 3-4).

The fraction surviving between Sacramento and Suisun Bay, S_0 , equals $\frac{R_1}{M_1} \div \frac{R_2}{M_2}$ where R_1 is the number of marked adults recovered from the Sacramento release; M_1 is the number released at Sacramento; R_2 is the number of marked adults recovered from the Suisun Bay release; and M_2 is the number released in Suisun Bay. We assume both release groups survive the same after passing Suisun Bay. Hence differences in the two recovery rates reflect mortality of the Sacramento group as they migrated through the Delta. The fact that these survival estimates are based on a

Appendix 16

Smolt Survival Estimates

Based on Midwater Trawl Marked Smolt Recoveries

Methodology

Our Delta survival index, \hat{S}_T , was based on the recovery of coded wire tagged (CWT) smolts (released between 1978 and 1986) recaptured by daily mid-water trawling at Chipps Island or the Golden Gate. $\hat{S}_T = R/MT(0.0078)$ where R is the number of trawl recaptures from CWT salmon released upstream of the trawling site; M is the number of marked salmon released, and T is a factor accounting for the portion of time sampled when the marked fish were passing the trawl site (time between capture of first and last marked fish). The value (0.0078) equals the trawl width (9.1 m) divided by the width of the channel at Chipps Island (1200 m). Another fraction was used for the Golden Gate trawl site. The survival index based on the midwater trawl has the advantage of providing results at the end of the emigration season while the survival estimate based on ocean tag recoveries requires waiting a minimum of three years.

*-Lucas index -
new trends.*

Appendix 1

Relative Abundance Indices Based on
Midwater Trawl SamplesMethodology

Annual relative abundance indices of fall-run smolts that were leaving the Delta were estimated from 1978 to 1986 by sampling 2 to 7 days/week during daylight hours at Chipps Island near Pittsburg, California with a 9.1 by 7.9 m (3.2 mm mesh, code end) midwater trawl. The trawl fished approximately the upper one half of the water column where over 90% of the smolts are found during daylight (Wickwire and Stevens, 1970). Ten tows/sampling day were taken from April through June. Abundance indices equaled the mean catch per 20 minute tow. Tows were generally made against the current and distributed across the channel with 3 or 4 tows per day made on the north, middle and southern portion of the channel. Engine speed was held constant during each tow to keep the volume sampled/tow consistent.

Another relative smolt abundance index was gained using an identical size midwater trawl at the Golden Gate Bridge in San Francisco Bay. That sampling occurred primarily from April through July from 1983 to 1986.

ratio allows us to make comparisons between years because the effects of variation in ocean survival on Delta survival estimates have been factored out. Detailed marked smolt release and adult recovery information, resulting Delta survival estimates and methods are provided in Appendix 13 and 15.

The second approach used to estimate smolt survival, S_T , was based on midwater trawl recoveries of coded wire tagged smolts at Chipps Island. These fish were released further upstream in the Delta. Details of the methods, and release and recovery data for this approach are provided in Appendices 16 and 17.

Smolt Survival in the Sacramento River Delta

Effects of Flow

Based on ocean tag recoveries, the survival of smolts through the Delta from Sacramento to Suisun Bay was related to mean daily Sacramento River flow at Rio Vista (Figure 4-1). Survival, S_0 , increased rapidly with an increase in flow from about 5,000 to 21,000 cfs where survival appears maximum. Smolt survival remains at about 100% at Rio Vista flows over 21,000 cfs. Survival values over the theoretical maximum of 100% for 1982 and 1983 may reflect sampling imprecision or some unknown bias. This indicates we should view all values as indices of survival rather than as absolute values. Smolt survival measure, S_0 , is believed to be a closer representation of absolute survival than S_T , since bias associated with trawl net avoidance is eliminated.

Record

Received OKC

10/31/94

ENVIRONMENTAL ALTERNATIVE TO URBAN/AGRICULTURAL BAY-DELTA PROPOSAL

The recent urban/agricultural proposal for San Francisco Bay/Delta standards will not meet the minimum requirements of federal and state law. Nor will it provide the comprehensive set of ecosystem-based protections that is needed to meet the water users' goal of reducing the effect of the Endangered Species Act on water project operations in the Bay/Delta system.

Summarized below are key deficiencies in the urban/agricultural proposal and an alternative to address these deficiencies developed by four environmental organizations.¹ The environmental alternative is based upon the minimum biological needs of the estuary and is designed to be reasonable, equitable, and workable.

Delta Export Limits: The urban/agricultural proposal contains an overly simplistic set of export limits based upon fixed ratios between Delta exports and Delta inflow. The environmental alternative recommends a combination of set export constraints in critical months and the development of a more sophisticated formula for determining allowable export rates in other months that considers a broader range of factors.

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San Joaquin Warm Water Habitat: The urban/agricultural proposal deletes this standard which has been proposed by USEPA. It is included in the environmental alternative. This criterion would help protect aquatic resources from the adverse effects of agricultural drainage pollution.

Spring-Run Salmon Protection: The environmental alternative incorporates protections not included in the urban/agricultural proposal designed to help avoid the listing of the spring-run under the Endangered Species Act.

Suisun Marsh Protection: The urban/agricultural proposal includes measures that are not adequate to protect this important wetland resource and are not based on sufficient scientific information. The environmental alternative contains standards for the managed marsh as originally adopted by the state in 1978 and narrative criteria for tidal marsh areas as proposed by USEPA.

¹Details of the alternative are contained in an October 24, 1994 letter from The Bay Institute of San Francisco, Environmental Defense Fund, Natural Heritage Institute, and Save San Francisco Bay Association to the State Water Resources Control Board.

THE BAY INSTITUTE OF SAN FRANCISCO
NATURAL HERITAGE INSTITUTE
ENVIRONMENTAL DEFENSE FUND
SAVE SAN FRANCISCO BAY ASSOCIATION

October 24, 1994

John Caffrey, Chair
State Water Resources Control Board
P.O. Box 100
Sacramento, Ca. 95812-0100

Re: Outline of a Bay/Delta Environmental Alternative

Dear Mr. Caffrey,

Over the course of the State Board's various Bay-Delta proceedings the environmental community has submitted voluminous data and information supporting the adoption of improved, protective water quality standards for the Sacramento-San Joaquin Delta Estuary. This letter is intended as the outline of an environmentally sound alternative for comprehensive Bay-Delta standards and operational requirements.

We emphasize that while this alternative would result in a significant interim improvement in existing Bay/Delta protection, it does not represent an acceptable level of protection for the estuary's aquatic resources over the longer term. We would expect that additional environmental improvements be developed as a primary purpose of the long-term planning process proposed in the state-federal framework agreement. The proposal includes a common set of standards supported by The Bay Institute of San Francisco, Natural Heritage Institute, Environmental Defense Fund and Save San Francisco Bay Association, but does not include every specific recommendation these groups have made. It is intended to establish minimum baseline flow, salinity, and operational requirements. At the same time, we believe that this alternative can be implemented without unreasonable impacts on urban and agricultural water users.

We encourage the Board to consider alternative sets of standards which would meet its obligations under federal and state law to protect the beneficial uses of the estuary, and we welcome the opportunity to work with other parties to develop such standards. However, proposals by agricultural and urban water users, or any other parties, that are not as protective as the federal criteria, and will fail to avert increased intervention to prevent extinction of endangered Bay/Delta species, are simply not acceptable and do not merit the Board's consideration.

With this in mind, we have organized and formatted the Bay-Delta Environmental Alternative to facilitate comparison with the proposal for standards being developed by urban and agricultural water users. The urban/agricultural recommendations were developed without the active participation of either the environmental community or agency personnel. While the urban/agricultural group has invited non-participants to comment

John Caffrey
October 24, 1994
Page 2

on its draft recommendations, it has not entered into negotiations with the environmental community or fish and wildlife agencies. Thus, the alternative outlined herein is intended to provide the Board with a more environmentally sound alternative to the urban/agricultural proposal.

We acknowledge that the proposal developed by the urban/agricultural coalition is based on the premise that the need for environmental improvement in the estuary is clear and urgent, and the proposal itself contains important components for increased protection of estuarine resources. Most importantly, the urban/agricultural recommendation includes an X2 standard which is similar to that proposed by EPA and the environmental community.

Some differences obviously remain between the two proposals. We continue to believe that the level of protection achieved should replicate pre-1968 conditions, since declines in estuarine populations and dramatic increases in Delta exports were experienced during the late 1960s/early 1970s period, and that a confluence salinity requirement should be in effect for the entire 150 day period, in order to limit exposure of aquatic organisms to unsuitable upstream habitat areas and to ensure that downstream habitat requirements are actually achieved using the salinity or flow compliance regime. (In proposing partial or floating compliance with a confluence requirement, the urban/agricultural proposal implicitly recognizes the need to place some limits on upstream variability). Overall, however, it bears repeating that there exists an extremely high degree of consensus over the justification and format for the X2 standard.

In other critical areas, unfortunately, the urban/agricultural proposal is deficient. The most pressing of these are: (1) failure to provide adequate limits on Delta exports; (2) failure to provide adequate protections for outmigrating San Joaquin River salmon smolts during the spring period; (3) failure to provide an adequate San Joaquin Warm Water Habitat standard; (4) failure to provide adequate fall period protection for outmigrating spring run chinook; and (5) failure to provide adequate protection for Suisun Marsh. We address these issues in turn below.

Delta Export Limits

The urban/agricultural proposal acknowledges the importance of limiting water exports from the Delta during critical periods of salmon smolt out-migration. It recommends limiting exports to a fixed percentage of Delta inflow each month: 30 percent of inflow from March through June, 35 to 65 percent of inflow from July through August, and 55 to 65 percent of inflow from September through February. The proposal also relies upon monitoring information to determine whether adjustments in the export/inflow ratio would be appropriate.

However, a ratio between Delta inflow and Delta exports is too simplistic to reflect the complex relationship between exports and their impacts on aquatic resources. Simple export/inflow ratios are not sufficiently linked to achieving a necessary level of protection from the adverse impacts of entrainment of aquatic organisms at the export facilities. Extensive analysis by the resource management agencies have demonstrated the strong correlation between export levels and these entrainment effects, and have

John Caffrey
October 24, 1994
Page 3

resulted in recommendations for more stringent absolute export limits under varying water year types. In addition, simple export/ inflow ratios do not reflect the impact of in-Delta diversions or habitat availability (i.e., X2 position) at the time and level of export.

The urban/ agricultural proposal's reliance on monitoring of species take to adjust the inflow/ export ratio presupposes an ability to track and respond to biological resources which is beyond our capabilities at this time. More importantly, because, the biological justification for setting a particular export/ inflow ratio is unclear, it is uncertain what criteria would be used to adjust these ratios in the event of increased or decreased take. The Board should concentrate on adopting those salinity, flow and export measures which will reduce the risk of unacceptable take, rather than embrace a highly conjectural new approach to defining take.

Export constraints are and should remain an important component of Bay/Delta water quality regulation. However, we believe that export limits which are more sensitive to natural hydrological conditions than current export limits based on water year types can and should be developed for the period of November through March and in June (with absolute export limits always retained in April and May, as discussed below). The environmental organizations are working on alternative export criteria which could be expressed as a function of such physical variables as Delta inflow and the relative contribution of the Sacramento and San Joaquin Rivers, in-Delta diversion, and X2 position. Such criteria would allow for increased export under high flow conditions, although absolute maximums to protect biological resources would have to be established. We invite the Board and other parties to help us refine this approach for future use as operational requirements. In the absence of such an export function, we recommend that absolute export constraints based on water year type be developed and adopted by the Board for the period of November through June.

San Joaquin Salmon Protections

The U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) have established that protection of fall-run chinook salmon smolt outmigration during April and May is essential to ensure successful passage to the ocean, and have identified measures, including increased minimum flows and decreased export levels, to achieve such protection for the declining San Joaquin River population. Slight increases in flow from historical levels will fail to achieve the recovery of chinook and other populations which are the goal not only of the water quality setting process, but the CVPIA anadromous fish doubling program as well.

The urban/agricultural alternative is unacceptable in this area. Their proposal provides for much lower flows than those recommended by USFWS or that would result from implementation of the standards proposed by EPA. Moreover, the urban/ agricultural proposal would allow export pumping of 100 percent of the San Joaquin River flows during the spring period. At these export levels, the pumps are likely to take not only large numbers of salmon smolts, but Delta smelt and other aquatic species. There exists general agreement among fishery biologists that absolute limits of around 1500 cfs are required during the April-May period, a conclusion confirmed by agency staff, environmental scientists and urban consultants at a series

John Caffrey
October 24, 1994
Page 4

of technical meetings on salmon protection earlier this year.

The environmentally sound alternative we propose would include flows, depending on water year type, from 1000 to 3000 cfs at Jersey Point and from 4000 to 10,000 cfs at Vernalis, and absolute export limits of 1500 cfs during the critical April-May period. (The April-May export limits are not replaceable by an export function). We also recommend adoption of EPA's revised salmon smolt survival indices for both San Joaquin and Sacramento River populations, which provide survival targets to help guide implementation and evaluate the efficacy of these operational requirements for salmon.

San Joaquin Warm Water Habitat Standard

The Bay-Delta Environmental Alternative includes EPA's proposed salinity standard for the lower San Joaquin River, which will prevent the formation of a salinity barrier from land-derived salts and therefore protect spawning habitat for striped bass, and possibly other species, during April and May. This criterion also serves as a surrogate for protection of southern Delta aquatic populations from the effects of contaminants in agricultural drainwaters loaded to the San Joaquin River.

Spring-Run Protections

We have previously provided evidence to the Board regarding the need for standards to protect outmigrating spring run chinook during the fall months in order to avoid listing the species under the Endangered Species Act. Specifically, the Delta Cross Channel gates must be closed, and strong Sacramento River flows provided, during the November through January period to ensure successful smolt migration to the ocean.

Under the urban/agricultural proposal the Cross Channel gates would remain open in November and December, leaving spring run smolts vulnerable during most of their out-migration period. In addition, the proposal fails to provide Sacramento River flows until February.

FWS and CDFG staff and other biologists have confirmed that protections for spring run during November through January are essential, particularly for the very limited Mill and Deer Creek populations. They are confident that adult upstream migration during this period would not be impaired by Cross Channel closure since the Georgiana Slough would remain open. The alternative outlined herein includes these recommendations.

Suisun Marsh

The urban/agricultural proposal does not include increased protections for the unmanaged tidal marshes of Suisun Bay, and would in fact allow current protections for the managed wetlands of Suisun Marsh to be weakened through adoption of the deficiency standards contained in the Suisun Marsh Preservation Agreement. Moreover, the biological assessment required by the Board as a precondition to its consideration of whether to adopt the SMPA

John Caffrey
October 24, 1994
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has yet to be completed. In our view, the biological assessment should be redirected to facilitate data collection and analysis for the development of numeric criteria to protect the brackish tidal marshes. The Bay/Delta Environmental Alternative includes narrative criteria for the brackish tidal marshes and reinstatement of the original D-1485 numeric standards and compliance points for the managed wetlands.

In sum, we believe that we have crafted an alternative set of standards and operating requirements that is reasonable, equitable and workable. Our alternative is based on the minimum biological needs of the Estuary, but is intended where possible to minimize the water costs for the various user groups. We look forward to working with the Board as well as other interested parties on refinements of this alternative.

Sincerely,

Gary Bohker
The Bay Institute of San Francisco

David Fullerton
Natural Heritage Institute

John Krautkraemer
Environmental Defense Fund

Barry Nelson
Save San Francisco Bay Association

enclosure

Natural Heritage Institute
The Bay Institute of San Francisco
Environmental Defense Fund
Save San Francisco Bay Association

OUTLINE OF A BAY/DELTA ENVIRONMENTAL ALTERNATIVE
October 21, 1994

Spring (February 1-June 30)

Suisun Bay estuarine habitat	X2 isohaline standard (per Harbold, EPA, 6/10/94 letter to Barnes, DWR, Study 1, 1955 level of development)
Sacramento River flow at Rio Vista	all years: 6000 cfs
San Joaquin River flow at Vernalis	
April 1-May 31:	W: 10,000 cfs AN: 8,000 cfs BN: 6,000 cfs D: 5,000 cfs C: 4,000 cfs
San Joaquin River flow at Jersey Point	
February 1-March 31:	all years: 1,000 cfs
April 1-June 30:	W: 3,000 cfs AN: 2,500 cfs BN: 2,000 cfs D: 1,500 cfs C: 1,000 cfs
Sacramento River salmon smolt survival index	1.48 T<61F SR= 6.96-0.92*T: 61F<T<72F 0.48 T>72F
San Joaquin River salmon smolt survival index	SJ1= -0.012+0.184*SJWYI SJWYI>2.5 0.205+0.0975*SJWYI SJWYI<2.5
Delta Cross Channel Gate	Closed
San Joaquin warm water habitat	.44 mmhos/cm EC
April 1-May 31:	W/AN/BN: Jersey Point to Vernalis D/C: Jersey Point to Prisoners Point
Suisun Marsh	D-1485 + narrative standard for brackish tidal marshes (per Seraydarian, EPA, 8/31/94 letter to White, USFWS, and Lecky, NMFS)
Municipal and industrial	D-1485
Delta agriculture	D-1485
Export limits	
February 1-March 31:	sliding scale function
April 1-May 31:	1500 cfs
June:	sliding scale function

Summer (July 1-August 31)

Municipal and industrial	D-1485
Delta agriculture	D-1485
Striped bass survival	D-1485
Salmon migration	D-1485
Export limits	sliding scale function

Fall (September 1-October 31)

Municipal and industrial	D-1485
Salmon migration	D-1485
San Joaquin River flow at Vernalis	
October:	all years: 1,000 cfs + 28,000 cfs pulse
Suisun Marsh	D1485 + narrative standard
Export limits	sliding scale function

Winter (November 1-January 31)

Sacramento River flow at Rio Vista	all years: 6,000 cfs
San Joaquin River flow at Jersey Point	all years: 1,000 cfs
Municipal and industrial	D-1485
Suisun Marsh	D-1485 + narrative standard
Export limits	sliding scale function

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202 208 4021

GENERAL COUNSEL →→→ EPA REG 9 (ORC)
WASHINGTON USBR →→→ -MARY E LEVINE

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**THE BAY INSTITUTE OF SAN FRANCISCO
NATURAL HERITAGE INSTITUTE
ENVIRONMENTAL DEFENSE FUND
SAVE SAN FRANCISCO BAY ASSOCIATION**

October 24, 1994

John Caffrey, Chair
State Water Resources Control Board
P.O. Box 100
Sacramento, Ca. 95812-0100

Re: Outline of a Bay/Delta Environmental Alternative

Dear Mr. Caffrey,

Over the course of the State Board's various Bay-Delta proceedings the environmental community has submitted voluminous data and information supporting the adoption of improved, protective water quality standards for the Sacramento-San Joaquin Delta Estuary. This letter is intended as the outline of an environmentally sound alternative for comprehensive Bay-Delta standards and operational requirements.

We emphasize that while this alternative would result in a significant interim improvement in existing Bay/Delta protection, it does not represent an acceptable level of protection for the estuary's aquatic resources over the longer term. We would expect that additional environmental improvements be developed as a primary purpose of the long-term planning process proposed in the state-federal framework agreement. The proposal includes a common set of standards supported by The Bay Institute of San Francisco, Natural Heritage Institute, Environmental Defense Fund and Save San Francisco Bay Association, but does not include every specific recommendation these groups have made. It is intended to establish minimum baseline flow, salinity, and operational requirements. At the same time, we believe that this alternative can be implemented without unreasonable impacts on urban and agricultural water users.

We encourage the Board to consider alternative sets of standards which would meet its obligations under federal and state law to protect the beneficial uses of the estuary, and we welcome the opportunity to work with other parties to develop such standards. However, proposals by agricultural and urban water users, or any other parties, that are not as protective as the federal criteria, and will fail to avert increased intervention to prevent extinction of endangered Bay/Delta species, are simply not acceptable and do not merit the Board's consideration.

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John Caffrey
October 24, 1994
Page 2

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This is part of our fed. criteria

Some differences obviously remain between the two proposals. We continue to believe that the level of protection achieved should replicate pre-1968 conditions, since declines in estuarine populations and dramatic increases in Delta exports were experienced during the late 1960s/early 1970s period, and that a confluence salinity requirement should be in effect for the entire 150 day period, in order to limit exposure of aquatic organisms to unsuitable upstream habitat areas and to ensure that downstream habitat requirements are actually achieved using the salinity or flow compliance regime. (In proposing partial or floating compliance with a confluence requirement, the urban/agricultural proposal implicitly recognizes the need to place some limits on upstream variability). Overall, however, it bears repeating that there exists an extremely high degree of consensus over the justification and format for the X2 standard.

In other critical areas, unfortunately, the urban/agricultural proposal is deficient. The most pressing of these are: (1) failure to provide adequate limits on Delta exports; (2) failure to provide adequate protections for outmigrating San Joaquin River salmon smolts during the spring period; (3) failure to provide an adequate San Joaquin Warm Water Habitat standard; (4) failure to provide adequate fall period protection for outmigrating spring run chinook; and (5) failure to provide adequate protection for Suisun Marsh. We address these issues in turn below.

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John Caffrey
October 24, 1994
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John Caffrey
October 24, 1994
Page 4

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10/26/94 14:52
10/25/94 15:22

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202 208 4021

GENERAL COUNSEL → EPA REG 9 (ORC)
WASHINGTON USBR → -MARY E LEVINE

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John Caffrey
October 24, 1994
Page 5

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In sum, we believe that we have crafted an alternative set of standards and operating requirements that is reasonable, equitable and workable. Our alternative is based on the minimum biological needs of the Estuary, but is intended where possible to minimize the water costs for the various user groups. We look forward to working with the Board as well as other interested parties on refinements of this alternative.

Sincerely,

Gary Bokor
The Bay Institute of San Francisco

David Fullerton
Natural Heritage Institute

John Krautkraemer
Environmental Defense Fund

Barry Nelson
Bay Area San Francisco Bay Association

enclosure

ENVIRONMENTAL ALTERNATIVE TO URBAN/AGRICULTURAL BAY-DELTA PROPOSAL

The recent urban/agricultural proposal for San Francisco Bay/Delta standards will not meet the minimum requirements of federal and state law. Nor will it provide the comprehensive set of ecosystem-based protections that is needed to meet the water users' goal of reducing the effect of the Endangered Species Act on water project operations in the Bay/Delta system.

Summarized below are key deficiencies in the urban/agricultural proposal and an alternative to address these deficiencies developed by four environmental organizations. The environmental alternative is based upon the minimum biological needs of the estuary and is designed to be reasonable, equitable, and workable.

Delta Export Limits: The urban/agricultural proposal contains an overly simplistic set of export limits based upon fixed ratios between Delta exports and Delta inflow. The environmental alternative recommends a combination of set export constraints in critical months and the development of a more sophisticated formula for determining allowable export rates in other months that considers a broader range of factors.

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Details of the alternative are contained in an October 24, 1994 letter from The Bay Institute of San Francisco, Environmental Defense Fund, Natural Heritage Institute, and Save San Francisco Bay Association to the State Water Resources Control Board.

MEMORANDUM

TO: CUWA/Ag standards development team

FROM: Bruce Herbold

RE: Setting of level of development to 1968 vs 1971.5

DATE: October 25, 1994

In joint testimony to the State Water Resources Control Board EPA, NMFS, and USFWS suggested that the late 1960s and early 1970s appeared to provide adequate habitat for estuarine species. The adequacy of this habitat appears to rest on two factors: a suitable level of development that existed up to or prior to this time and the level of unimpaired flow that occurred at that time.

The two variable model relating unimpaired flow and level of development assumes that the level of development acts upon an average level of unimpaired flow. However, in the period from 1965 to 1975 there were no dry or critically dry years, so the impacts of level of development were attenuated by the relatively high levels of flow. The average 8-River Index for this period is roughly 20% greater than the rest of the period of record (1965-1975, average=27.845 MAF, 1906-1964 & 1976-1992, average=22.805 MAF). From this EPA concludes that the impacts of the level of development in the 1968-1975 period were masked by substantially wetter than average years. Therefore, the suitable level of development occurred prior to the late 60s and early 70s. Without knowing the quantitative abundances of most estuarine species for any years prior to 1967 it is impossible to say at what time the level of development of the water projects was consistent with the habitat needs of estuarine species. EPA's choice of 1968 is the highest possible level of development consistent with these findings.

It is unclear how the CUWA/Ag staff arrived at 1971.5. If the late 60s-early 70s is defined as the period from 1968 to 1973 would yield an average of 1970.5.

FACSIMILE COVER PAGE

To: Tom Hagler
From: Bruce Herbold
Subject: WP Print Process
Pages (including cover): 2

Time: 16:33:22
Date: 10/25/94

TO Tom Hagler

FROM: Bruce Herbold

From P. Ristler

10/26/94

Economics Meetings

1/19/94 Urban / SB / DWR / USBR

3/1/94 Urban / " " "

* 6/17/94 Urban

* 6/28/94 All - Water Supply & 5/26/94 All Water Supply

8/31/94 Urban / SB / DWR - Mixed demand

* 6/20/94 } Ag
1/26/94 }

1/20/94 - Environ + Fisheries

* 6/30/94 Environ / SB

10/12 State Board Chiff - Informal
(didn't write up for admin record, went over results of RIA)

3/7/94 - Power (WAPA)

Other

4/18/94 Kern + Kern's Researchers (AG ECON)

TOM - If you want participant by meeting
I have that too

- Palmer

BAY/DELTA ECONOMICS

INFO LIST

Name	Affiliation	Phone #	FAX #
Arora, Sushil K.	DWR	916/653-7921	916/653-6077
Bahman, Sheikh	WRA	415/695-1178	415/695-1178
Bedker, Gary	USBR	916/978-5251	916/978-5284
Bobker, Gary	Bay Instit.	415/331-2303	415/332-8799
Dale, Larry	LDA	510/236-9630	510/236-8598
De Valpine, Perry	SCLDF	415/627-6700	415/627-6740
Denton, Richard	CCWD	510/674-8187	510/674-8122
Dixon, Lloyd	RNND	310/393-9411	310/451-6930
Eshoo, Paul	Bay Insti.	415/331-2303	415/332-8799
Farnum, Farhad	DWR	916/653-9415	916/653-6077
Fullerton, Dave	NHI	415/288-0550	415/288-0555
Griffin, Adrian	SWRCB	916/657-1832	916/657-2394
Hall, Steve	ACWA	916/441-4545	916/441-7893
Hanneman M.	UCB	510/841-6443	510/845-8639?
Hardesty, Sermin	CVPWA	316/753-1632	916/754-1904
Hoagland, Ray	DWR	916/653-6785	916/653-6077
Illingworth, Wendy		415/391-3558	415/391-3056
Ingram, Wes	SWRCB	916/653-3982	916/657-0394
Jackson, Michael	USBR		916/978-4854
Johnson, Lance	SL&DMWA	209/826-9696	209/224-1560
Kanin, Nadine R.	USFWS	916/978-4366	916/978-4619
King, Laura	EBMUD	510/287-1370	510/287-0128
Kratkramer, John			510/658-0630
Thabault, Mike	USFWS	916/978-4866	916/978-4619
McKusick, Bob	NEA/KCWA/NE	206/574-2554	206/574-7083
McLeod, Phillip	MHB Consult	510/834-1170	510/834-6504
Meyer, Harold	WRMI	916/920-1811	916/920-1812

Name	Affiliation	Phone #	FAX #
Mitchel, Dave	M3	510/547-4369	510/547-4369
Risler, Palma	EPA	415/744-2017	415/744-1078
Rosekrans, Spreck	EDF	510/658-8003	510/658-0630
Ryan, John	SCVWD	408/265-2600	408/266-0271
Schuster, Dave			916/446-0143
Spragens, Kip	EDMUD	510/287-1006	510/287-0128
Steinert, Byron	Westlands	209/224-1523	209/224-1560
Stephons, Vince	SCVWD	408/265-2600	408/266-0271
Stroh, Craig	USBR	916/978-5251	916/978-5284
Sunding, Dave	UCB	510/643-8364	510/643-8911
von Haam, Peter	MWDSC	213/217-6517	213/217-7778
Wear, Linda	NEA	206/574-2554	206/574-7082
Wegge, Thomas	J&S	916/737-3000	916/737-3030
Wichelns, Dennis	URI	401/792-4565	401/782-4766
Zilberman, Dave	UCB		510/643-8911

MEMORANDUM

TO: Tom Hagler
FROM: Bruce Herbold
RE: June requirements for Roe Island
DATE: October 30, 1994

As you are aware, in the development of EPA's sliding scale I have used a statistical program to determine the best fit of a logistical model to the historical data on the unimpaired flows in one month and the subsequent number of days when X2 has been downstream of Chipps and Roe islands. Austin Nelson of Contra Costa Water District obtained these data from me and has developed very similar results for each month except June at Roe Island. My statistical package refused to fit the model for that portion of the data. However, Austin Nelson's statistical package not only replicated my own work but produced the following coefficients for June at Roe Island:

$A = -81.976$ $B = -0.156$ $C = 10.699$

this model yields an r-square for fit to the data of .83.

The California Urban Wateruser Agencies relied on this work of Austin Nelson in developing their recommendations to the SWRCB of August 25, 1994. I understand from my conversations with Mr. Nelson that CUWA used these coefficients in calculating the number of days required at a 1971.5 level of development. However, they did not provide a technical appendix that gives the values so I am attaching a copy of a memorandum from Mr. Nelson and a supporting graph I obtained from Mr. Richard Denton of CCWD.

I therefore suggest that we include this equation in a June requirement at Roe Island. As with the other Roe Island equations I suspect that this will entail little, if any, change in operations at the current level of development.

Setting the target level of development to 1968 the coefficients for the table in the rule would become:

$A = -92.584$ $B = +10.699$

The modeling efforts for EPA have not included these parameters, but the modeling runs for the State Board have. Since the Board's water costs are not significantly greater than EPA's, it seems unlikely that the inclusion of these parameters would affect our economic analysis.

Comparison of Club Fed Proposal and Ag-Urban Water Users' Joint Proposal

November 1, 1994

The attached graphs and data tables are in response to questions raised at the October 18, 1994 meeting between Federal and State agency personnel, environmental organization representatives and members of the Ag-Urban water users' joint proposal technical group.

1. Define a dry & critical year trigger for meeting February X2 requirements at the confluence, i.e. based on previous January 8-River index.

The Ag/Urban proposal now has a revised sliding scale in February to address the above issue.

- At the confluence, X2 (with three ways to comply) is required to be met for 28 days.
- At Chipps Island, there is no X2 requirement when the January 8-River index is less than or equal to 1.5 MAF, and 28 days are required when it is greater than 1.75 MAF. Linear interpolation is used between 1.5 and 1.75 MAF to determine the number of days required.

2. Difference in X2 locations from operations studies between Water Users' proposal and the Club Fed proposal.

The three sets of bar charts show the February through June average location of X2 from monthly DWRSIM output. The graphs are for the three periods: 1922-1946, 1945-1969, and 1968-1992. Also shown are the X2 values for Roe Island (64 km), Chipps Island (74 km) and Collinsville (81 km).

The location of X2 was calculated using the monthly Kimmerer-Monismith equation. The DWRSIM studies were Alternative J (water users proposal) and 371 (first of three recent studies by DWR for EPA). DWR's description of the three recent studies, 371, 372 and 373, is also attached.

A table of February-June average X2 locations for four DWRSIM studies for the period 1922-1992 is also attached. The additional studies are for D1485 with the 1994 Endangered Species Act requirements (DWRSIM study 274) and D1485 only (DWRSIM study 272B).

Each page shows three months of historical DAYFLOW export/inflow ratios and, below, three months of export/inflow ratios with the full Ag-Urban water users' proposal (using CCWD's additional outflow model). The bars in each graph have different patterns depending on water year type (solid bars are the critical years). the bars in the two categories (drier and wetter years) are in chronological order.

The four pages of graphs show January through March, April through June, July through September, and October through December, respectively.

Table:

Average Export/Inflow ratios for each month categorized according to drier and wetter years.

Mth	Historical		Water Users	
	Ave Dry/Crt	Ave BN, AN&Wet	Ave Dry/Crt	Ave BN, AN&Wet
Jan	45.1%	14.9%	41.6%	14.7%
Feb	46.2%	8.5%	42.0%	8.4%
Mar	43.5%	9.1%	26.8%	9.0%
Apr	42.2%	16.4%	20.3%	12.8%
May	34.3%	19.6%	20.6%	15.9%
Jun	29.8%	25.1%	22.1%	21.1%
Jul	35.0%	31.7%	28.0%	27.2%
Aug	45.8%	37.4%	42.7%	36.8%
Sep	50.6%	26.7%	46.4%	26.5%
Oct	45.1%	26.4%	40.8%	26.1%
Nov	43.2%	20.6%	39.3%	20.6%
Dec	40.8%	16.2%	38.7%	16.2%

5. Comparison of Tracy and Banks Exports frequency/magnitude data for the water users and Club Fed proposals

Twelve histograms of Tracy and Banks export pumping data, one per month (two graphs per page), are attached. The data plotted are the 71 monthly export values for a given month for the period 1922-1992 from three DWRSIM studies: Water Users (Alternative J study), Club Fed (study 371) and D1485 only (study 272B).

Six pages of monthly export data, sorted by month, two months per page, are also attached. In addition to the three DWRSIM studies listed above, the output from DWRSIM study 274, D1485 with the 1994 Endangered Species Act requirements, are also tabulated.

3. Month to month variation in historical exports and export/inflow ratios (with and without proposed limits)

Three sets of line graphs of monthly historical exports at the Tracy and Banks export pumping plants are attached: 1968-1976, 1977-1984 and 1985-1992. The historical data (dashed line) are from DAYFLOW.

Note that in these graphs, values for calendar year 1968, for example, are plotted from 68.0 to 68.99. The change from June 1968 to July 1968 occurs at about 68.5.

Also plotted are the Tracy and Banks exports assuming only the Ag-Urban water users' proposed export limitations (export/inflow percentages and the 100% export/San Joaquin ratio). In other words, the DAYFLOW exports are reduced where necessary according to these export limitations but no other flow changes such as minimum Delta outflow requirements were made. CCWD's model does not include any reoperation of reservoirs upstream of the Delta so no attempt was made to recover export losses in other months.

This study illustrates that the Ag-Urban water users' export limitations alone represent a significant potential reduction in exports from historical values.

The next three sets of line graphs show the corresponding export/inflow percentages for the monthly historical exports at the Tracy and Banks export pumping plants (1968-1976, 1977-1984 and 1985-1992). The export/inflow limits proposed by the Ag-Urban water users and the resulting reduction from historical export/inflow ratio are also shown.

A table of the monthly variations in DAYFLOW historical exports and export/inflow ratios, the proposed limitations under the water users' proposal and the resulting reduction in exports and export/inflow ratios (assuming only the export limitations are in place) is also attached.

4. Comparison of Tracy and Banks Export/Inflow ratios from historical DAYFLOW data and water users proposals - drier and wetter year averages

Four pages of export/inflow ratio data showing the years 1967 through 1992 classified as drier years (critical and dry years, based on the 40-30-30 Sacramento River index) and wetter years (below normal, above normal and wet years). Note that the water year type is assumed to change on February 1 each year.

**STUDY ASSUMPTIONS
CLUB FED PROPOSALS (OCTOBER, 1994)**

STUDY 1995C6B-CFED-371 (Run #1)

1. The water quality standards in 1991 Water Quality Control Plan for Salinity (1991 Bay-Delta Plan).
2. The flow and export standards for the protection of fish and wildlife in D-1485.
3. The X2 isohaline standard contained in study 2' (1968 level of development with Roe Island triggered), as described in the Jun 10, 1994 letter from EPA to DWR.
4. Vernalis Pulse Flows (April 15 - May 15) vary between 2,300 & 10,000 cfs as a function of WYr Index (as described in the Aug. 17, 1994 letter from EPA).
5. Total Delta Export limits are as described in the Aug. 17, 1994 letter from EPA, as follows:

4/1 - 4/14	between 2,000 & 6,000 cfs as function of WYr Index.
4/15 - 5/15	1500 cfs for all year types.
5/16 - 5/31	between 2,000 & 6,000 cfs as function of WYr Index.
6/1 - 6/30	between 4,000 & 6,000 cfs as function of WYr Index.
6. QWEST Flow requirements:

11/1 - 1/31	-2000 CFS
2/1 - 2/28	0 CFS
3/1 - 3/31	+2000 CFS
4/1 - 4/30	0 CFS
7. Delta Cross-Channel Gate Positions:

Nov - Dec:	Gates closed for 10 days per month (total 20 days).
Feb 01 - Jun 30:	Gates closed at all times.

6. Comparison of QWEST frequency/magnitude data for the water users and Club Fed proposals

Twelve histograms of QWEST data, one per month (two graphs per page), are attached. The data plotted are the 71 monthly values for a given month for the period 1922-1992 from three DWRSIM studies: Water Users (Alternative J study), Club Fed (study 371) and D1485 only (study 272B). Values of QWEST greater than 10,000 cfs are not plotted.

Six pages of monthly QWEST data, sorted by month, two months per page, are also attached. In addition to the three DWRSIM studies listed above, the output from DWRSIM study 274, D1485 with the 1994 Endangered Species Act requirements, are also tabulated.

7. Analyze smolt survival on the San Joaquin River

An analysis of salmon smolt survival indices has been carried out by Dan Steiner. The results are presented as a bar graph showing the calculated smolt survival indices for 1965-1993 classified according to water year type. Results are presented for the historical flows, the water users' proposal with and without the Old River barrier and the Club Fed (EPA) with and without the Old River barrier. A table of results and a description of procedures used to compute the survival indices are also included.